2015 Ozone NAAQS Designations: St. Louis Area
Briefing for Bill Wehrum
March 29, 2018

St. Louis, MO-IL
EPA's intended nonattainment area (120-day letters) for St. Louis is a multi-state, multi-regional area that includes 5 counties in Missouri (Franklin, Jefferson, St. Louis, and St. Charles Counties and the City of St. Louis) and 3 counties in Illinois (Madison, Monroe, and St. Clair).

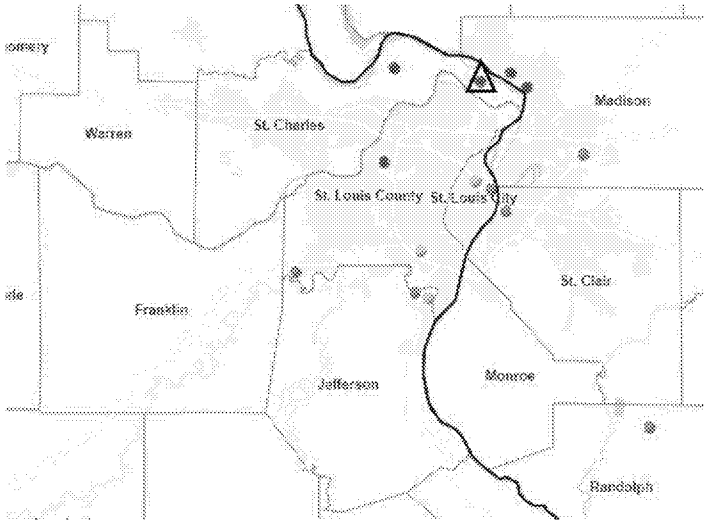
State Recommendations

- In 2016 Missouri recommended Franklin, Jefferson, St. Louis, and St. Charles Counties and the City of St. Louis as Nonattainment.
- Illinois recommended Madison, Monroe, and St. Clair Counties as nonattainment.
- In September 2017, Missouri requested that EPA not act on Missouri's 2016 recommendation, noting their expectation of only one violating monitor in Missouri (not 3) using 2015-2017 monitoring data.

States' February 2018 Responses

- Missouri disagrees with EPA's intended nonattainment boundary.
- Provided additional technical analysis focused on justifying exclusion of Franklin and Jefferson Counties from the nonattainment area based on claimed minimal contribution to violating St. Charles monitor.
- Illinois did not provide additional information or disagree with EPA's intended nonattainment area for St. Louis, IL-MO area, but intends to early certify 2015-2017 data that will demonstrate that the two Madison County violating monitors show attainment.

Figure 1: 2015-2017 ozone DV indicates one violating monitor in St. Charles County (triangle). Red monitors were violating based on 2014-2016 DVs.



Potential Options for an Intended Nonattainment Designation

1. Finalize EPA's proposed 8-county nonattainment area.
2. Drop Franklin and Jefferson Counties in Missouri from the boundary based on minimal contribution; finalize a 6-county nonattainment area.
3. Drop a yet-to-be identified western part of Franklin County and/or southwestern part of Jefferson County in Missouri from the boundary based on minimal contribution (not analyzed here); finalize an 8-county (6-full, 2-partial) nonattainment area.

EPA Staff Overview/Analysis

Option 1: Finalize EPA's proposed 8-county nonattainment area. Note: The proposed boundary for the 2015 ozone NAAQS is the same as the current boundary for the 2008 ozone NAAQS.

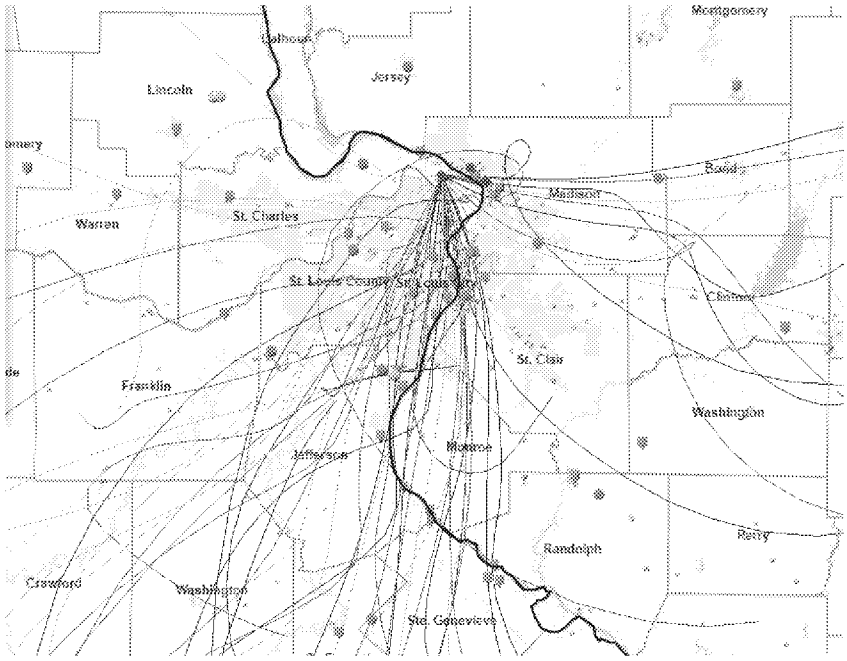
- **Air Quality Data**
  - Early certified 2017 data indicate only 1 violating monitor (in Saint Charles County, MO) compared to 3 violating monitors using 2014-2016 DV.
  - Trends: Table 1 indicates that design values remain fairly consistent across each 3-year period for each monitor.
  - While there are fewer violating monitors, the violating area is consistently in the northern downwind portion of the urban area.

Table 1. Air Quality Data in the St. Louis, MO-IL MSA

County/State	Local Site Name	AQS Site ID	2013-2015 Design Value	2014-2016 Design Value	2015-2017 Design Value
Jefferson, MO	Arnold West	290990019	0.070	0.070	0.068
Lincoln, MO	Foley	291130003	0.068	0.065	n/a
St. Charles, MO	**West Alton**	**291831002**	**0.071**	**0.072**	**0.072**
	Orchard Farm	291831004	0.069	**0.071**	0.070
Saint Louis, MO	Pacific	291890005	0.065	0.065	0.064
	Maryland Heights	291890014	0.070	**0.071**	0.069
City of St. Louis, MO	Blair Street	295100085	0.065	0.065	0.066
Jersey, IL	Illini Jr. High	170831001	0.066	0.068	n/a
Saint Clair, IL	IEPA-RAPS Trailer	171630010	0.066	0.068	0.068
Macoupin, IL	IEPA Trailer	171170002	0.064	0.064	0.065
Madison, IL	Clara Barton School	171190008	**0.071**	**0.071**	0.069
	Southwest Cable TV	171191009	0.069	0.067	0.068
	Water Plant	171193007	0.069	**0.071**	0.070
	Alhambra	171199991	0.068	0.067	n/a

- **Meteorology**
  - HYSPLIT back trajectories on ozone exceedance days (2015-2017) at West Alton violating monitor suggest potential contributions from the south and east, and to a lesser extent from the west-southwest

Figure 1 - HYSPLIT Trajectories and Location of Point Sources. Trajectories from the West Alton Monitor (St. Charles County, MO) using 2015-2017 exceedance days with 2015-2017 monitors (red: 100m, blue=500m, green=1000m). Larger point sources (orange squares) and smaller point sources (yellow stars). Also shown are monitor locations (red, green, and yellow circles).



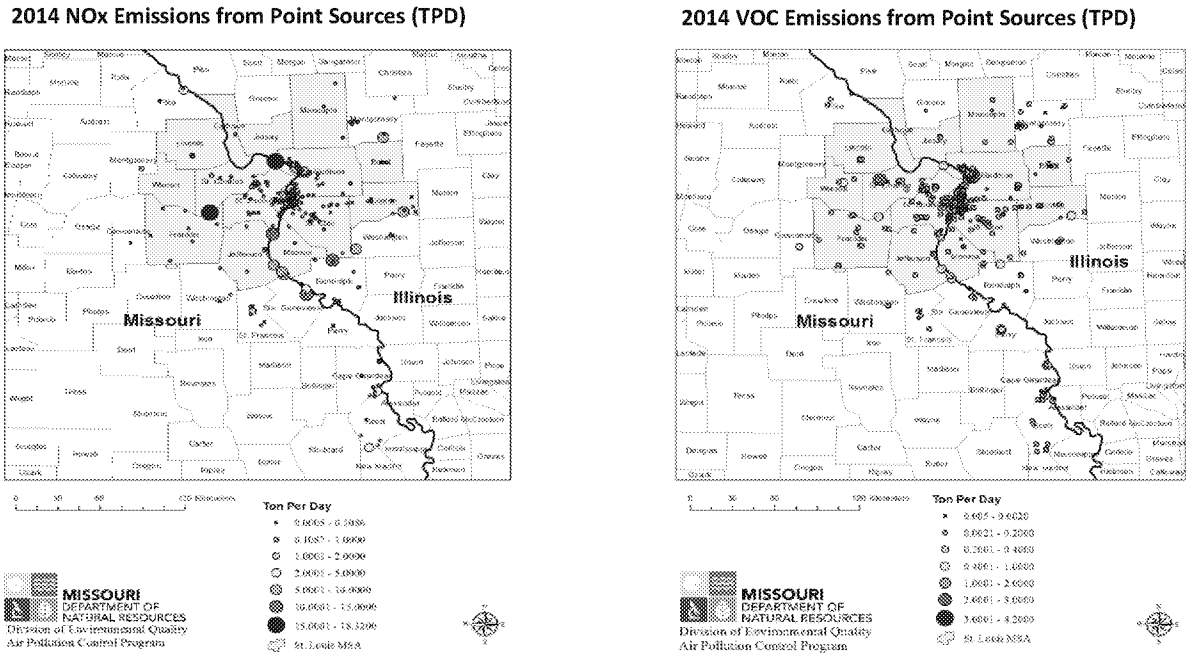
- **Emissions and Emissions Related Data:**
  - **Figure 1** shows multiple larger point sources in Jefferson County to the South, and one larger point source in Franklin County to the west-southwest of the metro area.
  - **Table 2** shows total NOx and VOC emissions in the EPA proposed nonattainment area.
  - Of the total emissions in the proposed nonattainment boundary, Jefferson County comprises 11% of total NOx emissions, and 9% of total VOC emissions. Emissions in Franklin County make up 11% of total NOx emissions, and 10% of total VOC emissions. This is more than neighboring Illinois Counties of Monroe and St. Clair.

Table 2. Emissions Data in the St. Louis, MO-IL proposed nonattainment area

County	NO_x (tpy)	NO_x % of total	VOC (tpy)	VOC % of total
St. Louis, MO	34,847	33%	26,869	37%
St. Charles, MO	16,190	15%	9,650	13%
Madison, IL	14,818	14%	9,036	12%
Jefferson, MO	12,067	11%	6,287	9%
Franklin, MO	11,742	11%	7,349	10%
St. Clair, IL	7,639	7%	5,949	8%
City of St. Louis, MO	7,243	7%	7,238	10%
Monroe, IL	2,682	3%	1,171	2%
Total	**107,228**		**73,549**	

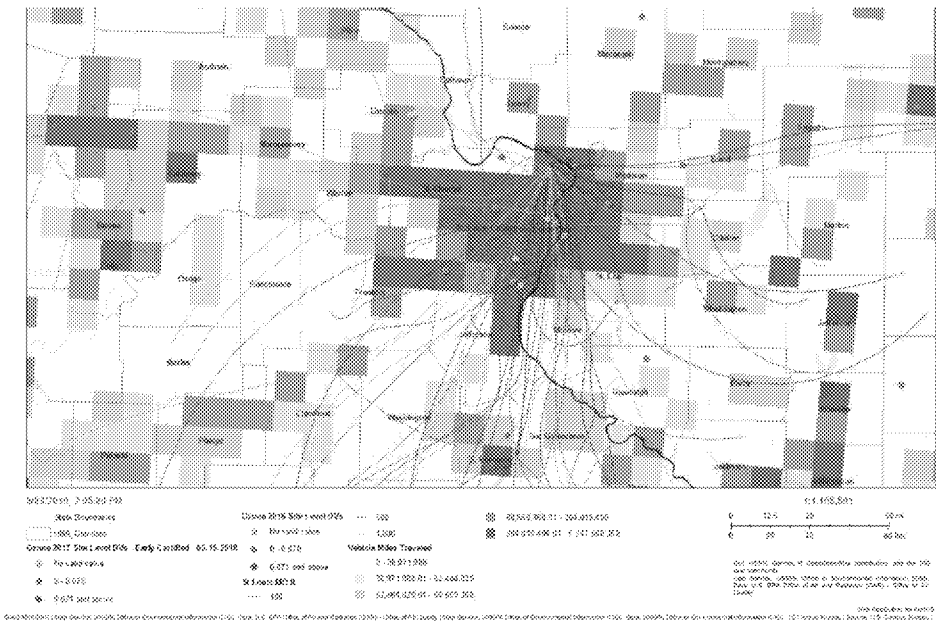
- **Figure 2** shows a more refined assessment of the relative magnitude of NOx and VOC source emissions in the area.
  - The large Franklin County point source emits 6,686 tpy of NOx and 260 tpy of VOCs.
  - Two large point sources in SE Jefferson County emit 2,850 and 3,300 tpy of NOx.

Figure 2. Point Source Emissions in the St. Louis MO-IL MSA.



- **On-road Mobile Source Emissions Indicator (VMT):** Jefferson County has 2,238 million miles VMT (20% of St. Louis County), greater than the city of St. Louis (1,838 million miles), while Franklin County has 1,532 million miles VMT.

Figure 3. VMT with Hysplit Back Trajectories to West Alton Monitor using 2015-2017 exceedances.



Option 2: Designate Missouri counties of St. Charles and St. Louis, and the City of St. Louis as Nonattainment, and Illinois counties of Madison, Monroe, and St. Clair as nonattainment.

- **Emissions and Emissions Related Data:**
  - As shown in Table 3, emissions from St Louis and St. Charles Counties, and the City of St. Louis, account for 78% of NOx emissions, 78% of VOC emissions, 81% of population, 90% of employment, and 77% of VMT in the Missouri counties that are a part of the 7-county St. Louis, MO-IL MSA.
  - Note: Missouri did not provide analogous data for Illinois.

Table 3. Emissions related data, population data, employment, and VMT in the Missouri Counties that make up the St. Louis, MO-IL MSA.

County	2014 Total VOC (TPD)	2014 Total Nox (TPD)	2014 Population	2014 Employment	2014 Million VMT per year	MSA VOC %	MSA NOx %	Pop. Percent % (MSA)	Employment % (MSA)	VMT % (MSA)
St. Louis	64.36	87.90	1,001,876	605,721	11,274.9	46.5%	40.0%	47.5%	56.4%	52.0%
St. Louis City	19.72	19.98	317,419	233,310	1,837.9	14.2%	9.1%	15.0%	21.7%	8.5%
St. Charles	24.24	41.64	379,493	130,895	3,581.9	17.5%	19.0%	18.0%	12.2%	16.5%
Jefferson	12.78	31.81	222,716	48,319	2,238.5	9.2%	14.5%	10.5%	4.5%	10.3%
Franklin	10.80	30.40	102,084	36,371	1,532.0	7.8%	13.8%	4.8%	3.4%	7.1%
Lincoln	3.69	4.79	54,249	11,342	572.9	2.7%	2.2%	2.6%	1.1%	2.6%
Warren	2.94	3.10	33,253	7,114	634.7	2.1%	1.4%	1.6%	0.7%	2.9%
MSA TOTAL (MO)	138.53	219.62	2,111,090	1,073,072	21,673					

  - Large clusters of point sources are found in St. Louis City and St. Louis County and the neighboring Illinois counties of Madison and St. Clair (See Figure 2).
  - MO states that sources in these areas, not Franklin and Jefferson Counties, are believed to have the most contribution to the violating monitor, since most of the emissions are in the City of St. Louis and the counties of St. Louis and St. Charles (See Table 3).
  - Missouri's revised recommendation states the contributions from the large point sources in Franklin and Jefferson Counties are not as significant as the contributions from sources closer to the violating monitor (See Figure 2).

- **Meteorology:** Missouri provides three surface weather maps for the three days with the highest ozone concentrations (86, 78, and 78 ppb) recorded at the West Alton monitor from 2015-2017 (Figure 4).
  - MO argues that meteorology and stagnant conditions due to the presence of stationary fronts lead to exceedances due to emissions in St. Louis City, and that counties in the back-trajectory paths will have little effect on ozone formation due to distance and lack of contribution.
  - However, HYSPLIT trajectories on these three days also show potential for emissions contribution from Jefferson and Franklin Counties, in addition to St. Louis City.

Figure 4. HYSPLIT at West Alton Monitor on the corresponding three days that MO provides surface weather maps (p.22 MO TSD).

- **Air Quality Modeling and Future Estimates:**
  - MO provided estimates of future mobile source emissions projections for 2023 using EPA's 2011v6.3 modeling platform and states that NOx and VOC emissions are decreasing area-wide, including NOx emissions in Franklin County and Jefferson County by 76% and 78%, respectively.
    - They do not provide corresponding county-specific estimates for VOC emissions.
    - They do not provide estimates for other counties.